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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/720,173	11/25/2003	Eun-Bong Han	102-1003	4330

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STANZIONE & KIM, LLP
919 18TH STREET, N.W.
SUITE 440
WASHINGTON, DC 20006

EXAMINER

LIANG, LEONARD S

ART UNIT	PAPER NUMBER
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2853

DATE MAILED: 12/16/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

BT/

Office Action Summary	Application No.		Applicant(s)	
	10/720,173		HAN, EUN-BONG	
	Examiner		Art Unit	
	Leonard S. Liang		2853	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 25 November 2003.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-30 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1,2,4,6,8-11,19,20,24 and 25 is/are rejected.
- 7) ☒ Claim(s) 3,5,7,12-18,21-23 and 26-30 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 25 November 2003 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|---|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Claim Objections

Claim 11 is objected to because of the following informalities: Claim 11 discloses "The inkjet printer head...when the switching unit is turned an and/or off..." It will be construed that the claim should state "The inkjet printer head...when the switching unit is turned **on** and/or off..." Appropriate correction is required.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

Claims 1, 4, 6, 8, and 24-25 are rejected under 35 U.S.C. 102(e) as being anticipated by the applicant's admitted prior art.

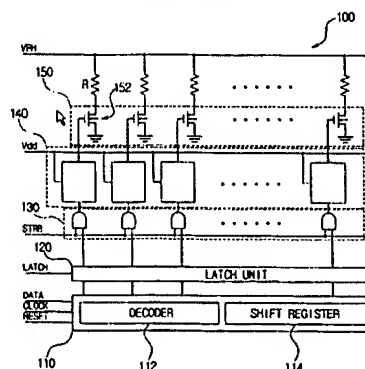
The applicant's admitted prior art discloses:

- {claim 1} An inkjet printer head driving apparatus having a plurality of heating elements and nozzles (figure 1, reference 100); a switching unit turning on and off each of the heating elements to heat ink corresponding to selected nozzles to eject the ink (figure 1, reference 150); a level shift unit having a level converter converting a potential level of a signal inputted therein into a predetermined potential level to drive the switching unit, and a transient time extending part

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provided with at least one time extending element to extend by a predetermined time a transient time during which the potential level of the signal inputted from the level converter to the switching unit is converted from a first signal level to a second signal level and vice versa (figure 1, reference 150; while it is appreciated that the admitted prior art does not include a transient time "extending part" as characterized later by applicant's specified invention, the examiner considers that the claimed invention here is sufficiently broad to be able to be read on by the disclosure of the admitted prior art in paragraph 0012 of the specification. In such a broad recitation, the delay of the output voltage of the level converter is seen to correspond to a transient time extension. As seen below, later claims that further describe the nuances of the transient time extending part, as characterized by the applicant's specified invention are objected to as being allowable); a control unit receiving an external data signal, decoding the received data signal, and outputting the decoded data signal as a nozzle selection signal to the level shift unit to select the selected nozzles corresponding to a to-be-recorded image from the nozzles (figure 1, reference 110)

FIG. 1
(PRIOR ART)



- {claim 4} wherein the transient time extending part comprises a first inverter inverting the signal outputted from the level converter (figure 2, reference INV1); and a second inverter extending the transient time from the first signal level to the second signal level or a second transient time from the second signal level to the first signal level in correspondence to an output signal of the first inverter (figure 2, reference INV2)
- {claim 6} A control method of an inkjet printer head driving apparatus having a switching unit driving heating elements corresponding to selected nozzles to eject ink through selected nozzles (figure 1, reference 150); outputting a nozzle selection signal to select nozzles corresponding to a to-be-recorded image out of the plural nozzles; receiving an inputted signal corresponding to the nozzle selection signal and converting a level of the inputted signal to a predetermined potential level to drive the switching unit; extending a transient time by a predetermined time in accordance with an output signal generating when the level of the inputted signal is converted, the transient time being a time period during which the level is converted from a first signal level to a second signal level and vice versa; and driving the heating elements corresponding to the selected nozzles to eject the ink through the selected nozzles based on the output signal from the transient time extending operation (Specification paragraph 0006-0014)
- {claim 8} An inkjet printer head driving apparatus having a plurality of heating elements and nozzles (figure 1, reference 100); a control unit generating a control

nozzle selection signal to select a heating element and a nozzle corresponding to an image to be printed (figure 1, reference 110); a level shift unit generating a first nozzle selection signal having a first transient time, during which a level of the first nozzle selection signal is changed between first and second levels, in response to the control nozzle selection signal, and generating a second nozzle selection signal having a second transient time extended by a period from the first transient time (figure 1, reference 140); and a switching unit turning on and off the heating element according to the second nozzle selection signal (figure 1, reference 150)

- {claim 24} wherein the switching unit comprises an FET, and a turning-on time of the FET is delayed by the period during which the first transient time of the first nozzle selection signal is extended to the second transient time of the second nozzle selection signal, to provide a sufficient time to charge and discharge a parasitic capacitance around the FET (figure 1, reference 152; specification paragraph 0006-0014, 0020)
- {claim 25} wherein the control nozzle selection signal comprises on and off signals to turn on and off the switching unit corresponding to the heating element, the level shift unit comprises a level converter to convert the control nozzle selection signal into the first nozzle selection signal having the first and second levels which are different from the on and off signals in signal level respectively (paragraph 0006-0025)

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 2, 9-11, and 19-20 are rejected under 35 U.S.C. 103(a) as being unpatentable over the applicant's admitted prior art in view of Hiwada (US Pat 6273537).

The applicants admitted prior art discloses:

- {claim 2} The inkjet printer head driving apparatus (as applied to claim 1 above)
- {claims 9-11} The inkjet printer head driving apparatus (as applied to claim 8 above)
- {claim 10} wherein the switching unit comprises a transistor having a first terminal coupled to the level shift unit, a second terminal coupled to the heating element, and a third terminal connected to a potential, and the residual voltage of the switching unit is a voltage of the first terminal (figure 1, reference 150)
- {claim 19} The inkjet printer head driving apparatus (as applied to claim 8 above); the first nozzle selection signal comprises a previous first nozzle selection signal and a current first nozzle selection signal, and the second nozzle selection signal comprises a previous second nozzle selection signal and a current second nozzle selection signal corresponding to the previous first nozzle selection signal and the current first nozzle selection signal of the first nozzle selection signal, respectively, and the voltage of the switching unit is a residual

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voltage remaining in the switching unit when the switching unit is turned off according to the previous second nozzle selection signal (specification paragraph 0006-0025)

- {claim 20} The inkjet printer head driving apparatus (as applied to claim 8 above); wherein the voltage of the switching unit is another residual voltage remaining in the switching unit when the switching unit is turned off according to the current second nozzle selection signal (specification paragraph 0006-0025)

The applicant's admitted prior art differs from the claimed invention in that it does not disclose:

- {claim 2} a discharging part discharging a residual voltage of a signal inputted from the level shift unit to a gate of the switching unit if the switching unit switching on and off the heating elements is turned off
- {claim 9} a discharging part discharging a residual voltage of the switching unit according to the first nozzle selection signal and/or the second nozzle selection signal
- {claim 10} the switching unit comprises a transistor having a first terminal coupled to the discharging part
- {claim 11} the discharging part is coupled to the level shift unit to receive the first and second nozzle selection signal so that the residual voltage of the switching unit is discharged according to at least one of the first transient time of the first nozzle selection signal and the second transient time of the second nozzle

selection signal when the switching unit is turned on and/or off according to the second nozzle selection signal

Hiwada et al discloses, with respect to claims 2 and 9-11, a discharging part attached to a print head drive circuit (figure 7, reference 3; column 7, lines 65-67).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to incorporate the teachings of Hiwada et al into the invention of the applicant's admitted prior art. The motivation for the skilled artisan in doing so is to gain the benefit of discharging the current that flows through the level shift unit. The combination naturally suggests:

- {claim 2} a discharging part discharging a residual voltage of a signal inputted from the level shift unit to a gate of the switching unit if the switching unit switching on and off the heating elements is turned off
- {claim 9} a discharging part discharging a residual voltage of the switching unit according to the first nozzle selection signal and/or the second nozzle selection signal
- {claim 10} the switching unit comprises a transistor having a first terminal coupled to the discharging part
- {claim 11} the discharging part is coupled to the level shift unit to receive the first and second nozzle selection signal so that the residual voltage of the switching unit is discharged according to at least one of the first transient time of the first nozzle selection signal and the second transient time of the second nozzle

selection signal when the switching unit is turned on and/or off according to the second nozzle selection signal

Allowable Subject Matter

Claims 3, 5, 7, 12-18, 21-23, and 26-30 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Claims 3, 5, 7, 12-18, 21-23, and 26-30 disclose subject matter, which was not found, taught, or disclosed in the prior arts.

Conclusion

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Hirayama et al (US PgPub 20030001911 A1) discloses a printhead, head cartridge having said printhead, printing apparatus using said printhead and printhead element substrate.

Hayasaki et al (US Pat 5519416) discloses a recording apparatus with cascade connected integrated drive circuits.

Imanaka et al (US Pat 6116714) discloses a printing head, printing method and apparatus using same, and apparatus and method for correcting said printing head.

Imanaka et al (US Pat 6382744) discloses a printhead and printing apparatus using printhead.

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Maru (US Pat 6471324) discloses a printhead with malfunction prevention function and printing apparatus using it.

Takeuchi et al (US Pat 6528925) discloses a piezoelectric/electrostrictive element driving circuit.

Hoshino (US Pat 6844658) discloses a drive circuit.

Tamura et al (US Pat 5504505) discloses an ink jet recording head and driving circuit therefor.

Kikuta et al (US Pat 5975670) discloses a recording apparatus for gradation recording.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Leonard S. Liang whose telephone number is (571) 272-2148.


The examiner can normally be reached on 8:30-5 Monday-Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Stephen Meier can be reached on (571) 272-2149. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

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MANISH S. SHAH
PRIMARY EXAMINER